



**STRATEGY
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IS THERE A FUTURE FOR THE ARSENAL SYSTEM?

**A DISCUSSION OF A METHODOLOGY FOR DETERMINING THE
VIABILITY AND EFFICIENCY OF THE ARSENAL SYSTEM**

BY

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A Discussion of a Methodology for Determining the Viability and Efficiency of the Arsenal System

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ABSTRACT

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The Army has operated an Arsenal System since shortly after this nation was founded. That system has proved invaluable in meeting the manufacturing needs of the military for over two centuries. In the future, will the arsenal system provide the same value? What methods can be used to make the arsenals efficient if they are determined to be of continuing value to the military? This Paper will discuss the possible value of the arsenal system to the military in the 21st Century and provide some considerations and methods for analyzing the system as it currently exists to determine process changes which will provide significant efficiency enhancements.

TABLE OF CONTENTS

ABSTRACT	iii
IS THERE A FUTURE FOR THE ARSENAL SYSTEM?.....	1
ENDNOTES	19
BIBLIOGRAPHY	21

Is There a Future for the Arsenal System?

A Discussion of a Methodology for Determining the Viability and Efficiency of the Arsenal System

The Arsenal System is almost as old as the United States itself. And the arsenals have served this country and its military well for over two hundred years by sustaining the war fighting capability of its Armed Forces. As we move into the 21st Century the Army must review the capabilities of the arsenals and consciously decide whether the arsenals still provide that value to the Armed forces that has been their hallmark for the last two centuries. If indeed there is value to the arsenal system, then it is imperative that the mission of the arsenal system be determined and firmly established and that serious decisions be made that will improve the overall efficiency and effectiveness of the arsenal system.

This paper will provide some rationale for the decision concerning continuing a government-owned, government-operated arsenal system as well as considerations for determining how to make the arsenals significantly more efficient. Regardless of the decision outcome, this methodology will primarily focus on areas that must be analyzed for both their contributions to the efficient performance of arsenal type functions and as areas for potential process improvements within the government structure.

Before attempting to determine the viability of the arsenals in the 21st Century, one should review the history of the arsenal system and develop an understanding of the reason for their existence.

HISTORY

After the Revolutionary War, statesmen and men of military experience advocated the development of a domestic arsenal system. The domestic armament industry was still in its infancy at this time, most of the weapons used in the Revolutionary War and subsequently stockpiled having been purchased or provided from other countries. The government first built public ordnance facilities to satisfy its needs for war material should the requirement to mobilize an army arise again. Congress appropriated funds for the building of arsenals as well as the manufacture of armaments and ammunition with the expressed purpose of making the United States independent of foreign nations in the essential military war materials.¹

The first Arsenal at Springfield Massachusetts was established by an Act of Congress on April 2, 1794. The mission of the arsenal, at that time, was the manufacture of muskets. But the true value of the arsenals was that they perfected the manufacturing techniques for a particular model or pattern of weapon prior to release of the contract to private arms manufacturers. Eli Whitney, one of 27 arms manufacturers who signed government contracts in 1798, provided technical assistance to the arsenal in the manufacturing technology that led to the production of interchangeable parts. Prior to this improvement, weapons were individually manufactured, which meant that each might be different requiring unique repair techniques and parts.²

The Springfield Arsenal, prior to World War II, was responsible for the manufacture of rifles, spare parts, and bayonets; small arms development; and the repair of rifles, revolvers, machine guns, and automatic rifles. It continued the missions of manufacture and repair after World War II until it was closed in 1968.³

In all fifteen manufacturing arsenals have existed in the history of the arsenal system, six of which survived until after World War II and only two of which remain operational today; Rock Island Arsenal, Illinois and Watervliet Arsenal, New York.⁴ The mission of Rock Island Arsenal is the manufacture of artillery materiel to include end items and critical spare parts for towed howitzers and self-propelled artillery gun mounts. The Arsenal also maintains the skill and knowledge base on prototyping, production engineering, production, and testing for towed howitzers and gun mounts. The mission of Watervliet Arsenal is the manufacture of large caliber cannon, which includes maintaining the skills and knowledge base for the prototyping, production engineering, and production of cannon and gun tubes.⁵

Much of the mission of the Arsenal may appear to be centered on the manufacture of the war materiel required for the United States Armed Forces. But the actual manufacturing capacity was relatively small compared to the armament requirements during wartime mobilization. In fact, the arsenals played a much greater role as research and development centers and as the repositories of manufacturing knowledge. These industrial complexes performed studies of the production processes, preparing plans for all armament items including the detailed instructions on their manufacture. During wartime, the arsenals served as the center of the production effort, providing private industry with the training and technical expertise necessary to meet production demands for war materiel. Their value in these areas was far greater than their actual production capacity.⁶

LEGISLATION AND POLICY

There are several instruments that provide direction to the Army concerning the maintenance and use of the arsenal system. And there are different interpretations of each of these instruments. But they form the basis for determining the destiny of the arsenal system and should be reviewed in some detail.

In 1920, Congress passed what is commonly known as the Arsenal Act. In its current version, this Act states:

"The Secretary of the Army shall have supplies needed for the Department of the Army made in factories or arsenals owned by the United States, so far as those factories or arsenals can make those supplies on an economical basis. The Secretary may abolish any United States Arsenal that he considers unnecessary."⁷

Some advocates of the arsenal system have interpreted this legislation as ensuring the continued existence of the Arsenal System regardless of the cost to the government to maintain this national resource. Critics of the Arsenal System cite the fact that the system must produce supplies on an economical basis. The question then centers on the interpretation of the term economical. If the Department of the Army were to retain the present system of two arsenals, which have the capabilities

and mission cited earlier, is this more economical than contracting for these capabilities in the private sector? To respond to this question, the Department of the Army must first address the question of the true mission of the Arsenal System. What was previously quoted as the "mission" of Rock Island Arsenal and Watervliet Arsenal is an assumed mission based on historical capabilities of the arsenals. What is needed is a statement by the Department of the Army specifying the factual mission of the arsenals for the future. The resolution of this issue is of paramount importance in determining any future viability of the arsenal system.

In a broad fashion that statement may have been made in a letter jointly signed by the Assistant Secretaries of the Army for Acquisition, Logistics and Technology and for Financial Management and Comptroller. According to this document:

"This memorandum establishes guidelines for the retention, management, and financing of Army-owned arsenals and factories. ...Army managers are required by the Arsenal Act to use arsenals and factories whenever they can satisfy the requirement, if it is economical to do so."⁸

This document reiterates the requirement to use the Arsenal System when it can satisfy the requirements of managers. It goes on to state how the term "economic" will be defined:

"When conducting the "make or buy" decision, evaluation of the government estimate should include the direct costs and only those indirect costs that would change as a result of changes in the number of items or components manufactured. The cost actually charged to the user will continue to include the full cost of production, to include direct and all indirect costs related to the production. ... In no case will the economic analysis include the cost of production capacity retained solely for emergencies."⁹

In fact, this document does no more to identify the mission of the arsenal system than any previous documentation, which still leaves that basic question unresolved. For example, if the arsenal in question has the capability in skills and facilities to manufacture a certain component or assembly, even though it is not something that is normally produced by that arsenal, do the Arsenal Act and this policy now apply simply because the arsenal has stated it has the capability to produce these items? A more concrete example occurred when a critical part on the Apache helicopter failed and resulted in grounding of the fleet. The contractor who originally manufactured these parts could not provide the replacement parts in less than ten months. The Army turned to an arsenal that had the capability to manufacture these parts. When this fact was brought to the attention of the contractor, changes were made in the production schedule and the parts were produced in much less time than originally projected. A second significant question in the process of determining the future of an arsenal system is this question of capability versus required mission that must be resolved soon because it directly relates to the matter of economics and efficiency in the arsenal system. This issue will be discussed in more detail later in this study.

Even though a specific mission has yet to be identified for the arsenals, understanding the rules for performing the economic analysis is another important facet of the issues facing the arsenal system and relates directly to the issue of viable missions for the arsenal system. If there is no equitable basis for comparison of costs between the arsenals and private industry, the determination of economic base of

the arsenals will always be in question. Since the inception of the arsenal system, one of the principal reasons for their existence has been to ensure a production and knowledge base in case of military emergency. The capability of the arsenal system to meet this requirement necessitates the retention of some amount (capacity) of this equipment and infrastructure that is specifically intended for such emergencies. Costs for retention of this additional capacity in fiscal year 1999 alone, as identified by arsenal planners using current methodology, were in excess of \$55 million.¹⁰ That figure does not include retention of skilled personnel or personnel who provide planning capability to handle such emergencies.

There is now a specific policy statement that defines the limits of costs that may be included in economic comparisons between having work performed in the arsenal system or in the private sector. This policy sets a level playing field against current capabilities of the arsenals, the various components of which can now be costed and analyzed based on their relation to the work being requested. So now there is a policy by which both advocates and critics of the Arsenal System must make decisions concerning future manufacturing workload.¹¹ What is not stated in the policy is a mission for the arsenals that identifies where their capabilities should be directed and what types of work they should be performing. This is another facet of the initial question, which is to decide what Army needs an arsenal system meets. Without that statement, in some policy document, the arsenals may be seen as gathering work to help make their operation efficient without a process to make the operation effective or valuable to the Army.

This policy also does not respond to the issue of cost efficiency of the arsenal system. This is an issue that has been raised not only in the Army, but also by Congress and the General Accounting Office. Specifically, GAO has commented on the declining workload, lack of participation in the "make or buy" process, workload and skill base mismatch, excess capacity and capability, and other factors directly related to the cost efficiency of the arsenal system.¹²

Lack of planning and determination of mission have a direct impact on the cost efficiency of the arsenal system. A strategic planning process, if used effectively, could help to identify those questions or issues that must be addressed in determining not only the future direction but also the viability of an arsenal system. There has not been a strategic planning document for the arsenal system in recent history.¹³ This lack of planning has also been recognized by Congress, which attempted to move the Department of the Army in the direction of strategic planning with the House version of the National Defense Authorization Act of Fiscal Year 1999. Specifically, this document states:

"...In a study nearing completion, GAO found that the Army cannot achieve the most cost-effective system without evaluating maintenance requirements for the total Army. ...The committee believes it is essential for the Army to assess its total maintenance program, including ad hoc programs that are being developed at the local installations level and any funding from procurement and foreign military sales. The Army must determine the appropriate mix of the various types of equipment maintenance that will ensure efficiency at public depots, arsenals and ammunition depots so that staffing levels are adequate and costs are lowered not only in the public depots, but also in the private sector or at the installation level...."¹⁴

The Department of the Army fulfilled the intent of Congress by performing a study to develop a strategic action plan for the depot system but neglected the arsenal system in its endeavors.¹⁵ The reasons for this lack of planning are unknown but the impact is significant. The lack of any coherent planning document for the future of the Arsenal System leaves the system itself open to continued criticism of its inefficiency and lack of focus. If the Department of the Army cannot describe its vision for the Arsenal System, then there is a lingering question concerning the leadership's commitment to the continuation of that system or of the system's ability to generate concern or support through meaningful, value-added mission accomplishment.

The Department of Defense has provided additional direction to the Army in an attempt to move the strategic planning process forward. In Program Budget Decision 407 for Fiscal Year 2000, the Department of Defense was particularly concerned about the cost efficiency of the arsenal system. This document states in part:

"It is obvious from the data that the long-term financial stability of the Ordnance activities is in jeopardy. The mobilization requirements are determined by the National Defense Strategy. Notwithstanding the need to support wartime requirements, it must be recognized that having this much capacity idle year after year is very costly. ... Accordingly, the alternative provides for the Army to lead a study, with participation from the OSD Comptroller, PA&E, AT&L, and the Joint Staff, to look at the proper sizing of the ordnance activities. The study recommendations should address the rightsizing of all of the ordnance activities to consider consolidation of existing facilities until unutilized capacity at any one facility is no higher than 25%."¹⁶

The term "ordnance activities" includes arsenals, ammunition plants and ammunition depots at the present time. According to some sources, facilities of the arsenal system are operating at less than 25% capacity.¹⁷ This is just the reverse of the utilization required from the study recommendations of the PBD 407. Such a dramatic increase in utilization will require a detailed analysis of the requirements for the arsenal system. Much of the capacity that is cited as unutilized is considered necessary to meet the mobilization, surge and reconstitution requirements of the arsenal system. However, this assumption requires further investigation. It must first be decided which capabilities are to be resident in the arsenal system before any discussion of capacity can be undertaken.

One additional statute that traditionally has not been applied to the arsenal system should also be discussed. Known as core legislation, this statute defines specific requirements for the Department of Defense in capabilities for core functions. In part, this statute states:

"(a) NECESSITY FOR CORE LOGISTICS CAPABILITIES. -(1) It is essential for the national defense that the Department of Defense maintain a core logistics capability that is Government-owned and Government-operated (including Government personnel and Government-owned and Government-operated equipment and facilities) to ensure a ready and controlled source of technical competence and resources necessary to ensure effective and timely response to a mobilization, national defense contingency situations and other emergency requirements." (2) The Secretary of Defense shall identify the core capabilities described in paragraph (1) and the workload required to maintain those capabilities. (3) The core logistics capabilities identified under paragraphs (1) and (2) shall include those capabilities that are necessary to maintain and repair the weapon systems and other military equipment... as necessary to enable the armed forces to fulfill

strategic and contingency plans prepared by the Chairman of the Joint Chiefs of Staff

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....

The arsenal system, by its current mission, manufactures components of weapon systems that are required for the repair and maintenance of those "core" systems as defined by the Department of Defense and cited in the statute. The statute further requires the Secretary of Defense to provide adequate workload for the core logistics capability to ensure efficient operation of the facilities. Under the provisions of this statute, the Department of Defense would be required to provide sufficient workload to make the Arsenal System efficient. However, all of the cited legislation, policy, and guidance appear to have as its objective the continuation of a historically valuable system that has no specified function today. This is contrary to the situation concerning the maintenance depots, which have defined missions and capabilities that are essentially commodity specific. The question of a specific mission and capability of the arsenal system still must be addressed. Then all of the "defining" requirements of legislation and policy support a beneficial enterprise for the Army as opposed to a failing institution.

CAPABILITY AND CAPACITY DETERMINATION

Before initiating a discussion on determining capability and capacity, it is necessary to understand the distinction between capability and capacity. The capability of the arsenal is that ability to provide specific skills, equipment, and facilities together in such a manner that certain components or assemblies can be produced. Capacity is the amount of a specific capability, in terms of man-hours, workstations, or combinations of factors that are available at the arsenal. So the capability is what can be done and the capacity is how much can be done. Capability is based on the specific mission requirements defined by the Army. It is only when capability has been determined that capacity can be sized to meet forecast workload in each specific capability.

The current capability of an arsenal is based on its historical mission. The Office of the Deputy Chief of Staff for Operations, Department of the Army, publishes a Critical Items List, which identifies those specific items that will require repair or maintenance in line with current Defense Planning Guidance. Based on the capability of a specific arsenal, formulas are used to determine the amount of capacity necessary to meet the requirements for replenishment of the components for the Critical Items List. Defense Planning Guidance identifies time lines that must be met for replenishment and reconstitution of forces. Analyzing the information in these source documents provides the information necessary to determine the specific capabilities that must be retained and the capacity requirements for each capability. Capabilities or capacity above those requirements are considered excess. Additional capacity may be required to meet peacetime workload, although this has not been the case in the past. However, peacetime requirements, by themselves, would not be used to determine the arsenal's long term capability. According to a recent study, approximately 10 percent of the arsenals' capacity is excess with another 75% unutilized.¹⁹ These numbers are open to discussion since the Critical Items List is in revision and the previous list is five years old.

Excess capability or capacity is that which burdens the system but provides no benefit since it is no longer required. Unutilized capacity is that which is required for surge or reconstitution and replenishment but is not required to meet current workload projections. While the terms appear to be fairly well defined, there has been much interpretation of these terms in the past. That interpretation has led to confusion in the amount of excess and unutilized capacity that exists at the arsenals today. Army policy or the Defense Planning Guidance could be made more specific, thereby significantly reducing or eliminating interpretations. This is another area that requires full consideration since these documents should drive the continuing planning process for the future arsenal system.

MOBILIZATION VERSUS SURGE AND REPLENISHMENT

During the build-up for World War II, including the period of time that the United States was involved in providing material to the Allied Forces and prior to the entry of the United States into the war, the military industrial base built significant capability and capacity to prepare for the massive requirements for manufacture and maintenance of military equipment. That mobilization philosophy carried through most of the Cold War era as well. Even though it was not the original intent of the arsenal system that they should be the sole manufacturers of war materiel, large amounts of capacity were still provided by the arsenals under the mobilization philosophy. Particularly since the Gulf War, the Department of Defense has shifted from a philosophy of massive build-up in response to conflict to a replenishment and reconstitution philosophy. There is some capacity to surge, from standard work shifts, but the significant investments in idle work capacity to support actual mobilization are not part of the current philosophy.

It is necessary to understand this change in philosophy to further understand the amount of idle capacity that resides at the arsenals. Without a current Critical Items List, there is no valid method to determine what is actually excess and what is unutilized. It is only when the true amount of excess is known that planning can begin for the consolidation of infrastructure and re-establishing an efficient work process. That knowledge allows the arsenal planners to size properly not only the infrastructure but the skilled workforce that operates the workstations; the planning, supply, and quality assurance personnel and supervisors that support the skilled workers; and the management and other support personnel necessary to control and maintain the overall operation of the arsenal. All of this starts with understanding the required capability and capacity of the arsenal system. The arsenal system must also develop and change to support newer systems with new skills and technologies or the arsenal system faces eventual obsolescence. The Critical Item List is not a stagnant document. Item selection and quantities of items that must be maintained change as the Army's requirements change. The capability of the arsenal system must keep pace with these changing requirements or the arsenal system will remain inefficient and ineffective in its ability to match capabilities to requirements.

ANALYSIS

Understanding the history of the arsenal system, the legislation and policies that govern the system and the explanation of capability and capacity does not answer the basic question that has yet to be addressed. There must be a legitimate purpose for the arsenal system in the 21st Century or everything else that has been discussed is supporting a hollow requirement. History demonstrates that in the past, there was a very real need for the arsenal system, not principally as a manufacturing center, but as a center of expertise for manufacturing²⁰. Legislation was proposed and policies promulgated to support the notion that the expertise and knowledge held by the work force in the arsenals was a National Resource²¹, one that must be retained in the public sector and not entrusted solely to the private sector.

The private sector facilitates and produces based on demand, not on the possibility of a demand based on events that may never materialize. They are responsible to the stakeholders of the organization and every dollar that is disbursed must in some manner contribute to the well being and profitability of the organization. That is a completely understandable business philosophy and one that has, in the past, been foreign to the Department of Defense. Because of the unique nature of the operations of the Department of Defense, it can not operate entirely from that perspective, but must move in that direction by systematically eliminating unnecessary capability or services that have no inherent or anticipated value based on specified requirements.

Private sector businesses do not establish, operate or continue business segments that have no specified mission. But the Department of the Army has done just that with the arsenal system and continues on that path. How does an organization determine whether a business segment is contributing substantially and substantively to the success of the total organization if it has no mission, no vision, and no business plan? Specific direction has been provided by the Assistant Secretaries of the Army concerning the use of the arsenal system and adherence to the Arsenal Act, but there is no specific direction concerning the role of the arsenal system based on stated capabilities and missions. Both Congress and the Office of the Secretary of Defense have provided direction on the development of a strategic plan and recently the U.S. Army Materiel Command directed the U.S. Army Industrial Operations Command to take the lead in the development of such a plan.²²

But to develop a strategic plan that can be executed, senior Army leadership must provide direction on the future of the arsenal system. That direction should specifically address the role of the arsenal system in the 21st Century and the scope of the mission of the arsenal system. The historical role of the arsenals may no longer fulfill the needs of the Army. Other than preserving the expert knowledge and skill base to oversee the manufacturing and prototype development of production systems, there may be no reason to retain what we now know as the arsenal system. But the thorough analysis of the requirements against the capabilities that the current arsenal system could provide and against the cost of modifying the current infrastructure to provide those capabilities must be performed. From that analysis, the senior leadership can decide the direction of the arsenal system. Given that direction, a strategic business plan can be formulated. The strategic business plan then takes the decisions

concerning the mission of the Army arsenal system, its inherent capabilities and where they will reside, the capabilities to be sought in the private sector, and the economic operating rules and set them in context of operating guidelines and objectives for the future. This process will require the continuing commitment of senior leadership of the Department of the Army and Department of Defense because less than fully following the strategic business plan will cripple the capability of the total arsenal system to meet its requirements and could result in the elimination of the arsenal system just as certainly as if the decision had been made outright.

One of the reasons cited for the arsenals not participating in the "make or buy" process is that the arsenals are incapable of producing the majority of the products currently being developed and produced.²³ While this statement certainly warrants further investigation, it may be that the Arsenal System no longer provides the expertise and knowledge that satisfy the manufacturing requirements and also will fail to do so in the future. If this is truly the case, then the one consistently core requirement for the arsenal system would be impossible to meet. To regenerate that capability would be resource and time intensive and would cause the arsenal system under any situation to be irrelevant.

If the arsenal system is not keeping pace with technology advances, then either the arsenals have outlived their usefulness or direction must be provided to infuse current and future technology into the Arsenal System. As history demonstrates, the arsenals were the repositories of the expertise and technology in their respective fields of manufacture. However, in rebuttal of this criticism of the arsenal system, both Watervliet and Rock Island Arsenals are involved in manufacture of components and assemblies for fielded weapons systems and for systems in development²⁴. The question appears to be not if the arsenal system is capable of manufacturing components or assemblies using currently available technology and production techniques, but whether the Department of the Army senior leadership is committed to continuing the manufacturing and production technologies infusion necessary to maintain a viable, relevant, and responsive arsenal system. This is part of the direction that must come from the senior leadership prior to developing a strategic business plan for the arsenal system.

Once the senior leadership accepts or adjusts the results of a strategic study to determine the future direction and focus of the arsenal system, then a strategic business plan can be developed to move the arsenal system in that direction. The U.S. Army Industrial Operations Command is currently formulating a strategy for the arsenal system. However, given the current lack of direction from senior leadership, any product or strategy that might be produced potentially could be unexecutable or at least ineffective in meeting the Army's future requirements.

As part of the response to the General Accounting Office Report on Industrial Facilities, the Army committed to and has established a Corporate Board that oversees the requirements process and business policies of the maintenance depot business processes.²⁵ This board is composed of members of the Army Staff and Secretariat at the flag rank. The arsenal system is no less complex or important and would benefit significantly from such oversight. This would also ensure that senior leadership maintains their involvement in the arsenal system business process. This board could guide the

development of the strategic study to determine the future of the arsenal system and subsequently the strategic business plan.

Based on the policies that have been promulgated recently by the Army Secretariat, it seems fairly certain that the arsenal system will enter the 21st Century²⁶. That leaves to senior leadership the task of determining the direction that the arsenal system should take. While the strategic study to propose that direction is underway, the Army has the task of attempting to create efficiencies in the current Arsenal System, efficiencies that would be applicable to the perceived future direction. If a Board is established similar to the Depot Maintenance Corporate Board, or if the arsenal system is incorporated into this Board, one of the initial tasks for this body could be the oversight of the review of current business processes.

This review of current processes ties directly to the overall strategy for the arsenal system. By initiating a critical look at the processes currently in practice and refining the business process based on current requirements, the determination of a future direction and strategy will be able to proceed from a more viable base. While the business areas cannot be fully defined and refined to meet efficiency goals, since these will be established by the strategic business planning process, it will be less resource intensive to make the refinements necessary to meet the strategic direction than to wait until that direction is fully refined. In effect this would be a shaping review process to prepare for movement in the strategic direction that senior leadership must eventually identify.

Three main areas should be considered in this review; capability and capacity, workload, and workforce. These are the same areas that will require change in process and change in objectives as the strategic business planning process is put into effect. Capability and capacity have been previously discussed but there are some short term initiatives that can be taken to set the stage for a more in-depth review as part of the strategic business plan. First, to ensure that the Critical Items List, currently developed by the Office of the Deputy Chief of Staff for Operations, remains a viable document oriented toward future requirements, it must be periodically reviewed and revised. One method to ensure this action takes place is to change the process of generating a Critical Items List and incorporate this listing in the Defense Planning Guidance or the Army Planning Guidance Memorandum. Then, using the most recent Critical Items List, the current obsolete capability can be identified. The newly designated obsolete capability as well as the currently identified excess capability and capacity can be planned for disposal and the funding requirement included in the programming and budget cycle. At the same time, leadership must initiate communication with Office of the Secretary of Defense and provide information to the General Accounting Office and Congressional Staff to keep them informed of the direction and scope of the efforts relating to review of the arsenal system business processes. Disposal of excess is a time consuming and expensive process that will require support of Congress and Office of Secretary of Defense officials as the planning and programming activities progress. This near term excess disposal plan can be incorporated into the strategic plan for the future of the arsenal system and the strategic

business plan once these plans are completed and become part of an continuing review process against the Critical Items List and other planning guidance.

If a legal interpretation can be obtained to require that workload for the arsenal system must comply with provisions of the core language, not only will program managers have to provide technological capability to meet maintenance requirements for their systems (i.e. manufacture of required components and assemblies) within four years of achieving initial operating capability, but work will have to be performed in the arsenals to the extent that they are made cost efficient.²⁷ This would not only help to shape capability by making manufacturing technology improvements in the arsenals, but would help to make the workload requirements more specific, predictable, and accurate. This process could also help shape the development of the Critical Items List by identifying requirements based on the acknowledged capability the public arsenal system requires then shape the capacity to meet requirements. In this manner the generation of the Critical Items List and the capability analysis become mutually supporting.

Workload must be reviewed to develop a realistic projection for the near term as well. Workload at the arsenals has fallen to an average of 14% of its previous 10-year high in terms of direct labor manufacturing man-years.²⁸ This review is a critical step in the process for several reasons. Developing a realistic projection helps to identify the peacetime capacity requirements for the useful capability for the arsenal system. That capacity that is not required for performance of peacetime workload is eligible for funding through unutilized plant capacity program funding. This is the cost of surge and replenishment capacity and is not to be charged to the customer but funded directly. Knowing the projected workload also allows the arsenals to make proposals for other work outside of the Department of Defense using the Army Secretariat's Arsenal Act Policy described previously.²⁹ This ability can offset the cost of maintaining unutilized capacity and make the arsenal business area more cost efficient for the Army.

Another potential source of additional workload for the arsenal system currently resides in the Army's maintenance depot system. Because of the age of militarily unique equipment, and in some cases, the obsolete technology inherent in the systems the Army still operates, private sector companies no longer manufacture repair parts for Army equipment. Depots have established capabilities to manufacture components and assemblies in an attempt to compensate for this lack of capability in the civilian sector. While maintenance and repair are the missions of the Army maintenance depot system, manufacturing is under the purview of the Army arsenal system. Workload of a manufacturing nature currently being performed in maintenance depots should be reviewed to determine where it should rightly be performed. Potential transfer of this workload from the maintenance depots should also be considered in this review.

Based on the statistics cited previously, history does not provide an accurate estimate of the workload requirement. Foreign Military Sales workload is also not reliable until funds are made available to the arsenals. A memorandum signed by General Coburn, Commander, AMC, charges each of the commodity commands and program managers to comply with the provisions of the Arsenal Act.³⁰ This will require the program managers to consider the use of the arsenals, through a deliberate economic

analysis, in their manufacturing requirements. However, there is no planning guidance attached to either the Army Secretariat Policy or the Commander, AMC policy. To make the workload projection process efficient, program managers must make the decision to use an arsenal and notify the arsenal of that decision so that the work can be programmed into the capacity calculations. This requires the arsenals and program managers to work as a team in the building of the manufacturing requirements. This process also requires arsenal management to ensure that program managers have a complete understanding of the actual capabilities of the arsenal system; knowledge, skills and facilities.

The accurate determination of workload for the arsenals also allows the development of an accurate workforce requirement. The direct labor workforce of an arsenal is a highly skilled pool of personnel who, in many cases, have a very specialized skill set. Knowledge of the skills required to complete the projected workload allows the arsenal to tailor the workforce to meet those needs. This is critical to ensuring that the arsenal has the appropriate mix of skilled personnel to meet the peacetime production and to maintain the critical skills necessary for surge and replenishment requirements.

There is no specific funding available to absorb the cost of retaining skilled personnel whose particular skill set may be required in the event of a crisis when surge or replenishment are executed. However, workstations alone do not guarantee that an arsenal has the capability to surge or replenish when required remembering that capability requires both equipment and skilled personnel. Multi-skilled personnel are a partial answer to this problem, but in some cases either unions or management have been reluctant to follow this approach³¹. This philosophy helps to ensure that the capability exists to execute all capability requirements, but may not provide the necessary capacity. Also remembering the original purpose of the arsenals as being a center of manufacturing expertise, the multi-skilled workforce can act as a core workforce in the event of a surge or replenishment requirement.

The incorporation of effective business practices and analysis, as just described, into the current operations will help to make the operations more efficient and capable of moving in the direction specified by the long term strategy. Current methods of sizing plant capability based on obsolete, mobilization-style philosophies, using historical data to identify workload, and uncontrolled reductions in force to streamline the workforce by size instead of required skill sets make any transition to effective and responsive operation of the business much more difficult. Arsenal business practices must start to conform to best commercial practices where feasible. This re-engineering process will require a significant change in culture and mindset as well as changes in policy. The oversight of these three components of arsenal near term effectiveness and efficiency requires senior level involvement to ensure that the arsenal system remains viable until a decision is made on the future focus and direction of the arsenal system and an approved strategic business plan is developed. As identified previously, a Department of the Army level corporate board could provide this oversight with the involvement of the U.S. Army Materiel Command as the Executive Agent for the operation of the Army's industrial base. Because of the potential overlap in functions assumed by the maintenance depots, it may be appropriate and useful for the Army Depot Maintenance Corporate Board to expand its area of oversight to

encompass the arsenal system as well. This would provide a single senior council for policy determination and oversight of the Army industrial base in its entirety. Such an oversight process could preclude redundancy in mission function and recommend policies that would promote industrial operations effectiveness and efficiencies regardless of the source of supply; maintenance depot or arsenal.

At the same time this oversight body is guiding the near-term arsenal business, it should be guiding the development of the strategic business plan that provides direction for accomplishing the arsenal functions of the future. There is no assumption here concerning the outcome of the strategic review to determine the future focus of the arsenal system. Whether the system continues as is currently projected or is eliminated, a business plan is required to determine how the processes currently performed by the arsenal system are to be performed in the future. The plan should be extremely clear about what the direction is for the arsenal system, any potential private sector ventures, and the methods of determining what constitutes success in this business area.

Business metrics must reflect a measure of success as defined by the strategic business process plan and not measures that identify those business areas as arbitrary goals. In other words, the metrics must demonstrate objectively and in real terms that the business processes are moving in the direction defined in the strategic business plan. For example, direct labor hours, if used as a measure of success, should measure whether the required skills, by identified skill set are being optimally utilized; not that all skills in the aggregate are being used. In fact, those skills that are not seen as critical or contributing to the core capabilities of the arsenal system should be showing declining workload as they transition to required skills through programs such as multi-skill training. Workload should be measured in two categories, that which contributes to the direction of the arsenal system and builds work in the core areas, and that which contributes to maintaining the business in a cost efficient manner. The latter may not contribute to core workload, hence the new direction for the business area, but is in fact transition workload that assists in keeping rates at a "competitive" level. These non-core work areas should be decreasing toward eventual elimination as the work in the core functions increases and the business areas take on their new direction. All measures of success must be determined from this perspective. If not, the arsenal system may look as though it is effective and efficient when in fact it is surviving in areas that do not contribute to the business areas which the Army needs in the arsenal system.

CONCLUSIONS

There is an historical basis to conclude that the arsenal system has made a significant contribution to national defense for well over 200 years. The capability of the arsenals to provide initial production capacity has allowed the private sector the necessary time to redirect production efforts and contribute to mobilization efforts. More importantly, the arsenals have been the repositories of manufacturing expertise for war materiel giving private industry the training and technical resources necessary for their successful participation in the mobilization effort.

Some critics of the arsenal system would argue that the capability to provide manufacturing expertise is vanishing. However, the arsenals are engaged in the manufacture of components and assemblies for the latest in Army materiel, including both equipment already fielded and that in final stages of development.³² Among the Services, the arsenal system also maintains unique manufacturing capabilities that are not readily available in the private sector. The arsenal system has been the first response to crisis in providing the Army with manufacturing capability critical to the sustainment of combat power. It has the capability to remain viable in this role. This capability as a center of expertise and knowledge base for manufacturing and production of components and assemblies is one that must be retained as an inherently governmental function and formally declared, by senior Army leadership, a core capability for the arsenal system. The purposeful retention of this future-focused expertise as a core capability provides the quality assurance and oversight capability to ensure that the government continues to receive value for its investment. In addition, limited manufacturing capability in a future arsenal system will cause that expertise and skill base to expand into new technologies as well as retain currently needed skills through low rate production. As previously explained, this expert workforce could also be the core capability that can be expanded to meet a surge requirement in either the public or private sector, as has also been the arsenal systems historical role.

Legislation levels the field in comparison with the private sector when Program Managers are considering the use of the arsenal system. Legislation also requires that use of the arsenals be a conscious part of the decision process in manufacturing components and assemblies.³³ Depending on the interpretation of core legislation³⁴, Program Managers may be required to facilitate arsenals for the manufacture of components and assemblies necessary for the repair of newly fielded or modified systems. This legislative interpretation would guarantee that future technologies would be infused into the arsenal system and further strengthen the core knowledge and skill expertise.

Policy jointly signed by the Assistant Secretary of the Army for Acquisition, Logistics and Technology and the Assistant Secretary of the Army for Financial Management and Comptroller further emphasizes the requirement for Program Managers to use the arsenal system to meet their requirements if this use is economical.³⁵ This policy stipulates the process for making an economic analysis. In addition, the Commander of the United States Army Materiel Command has issued policy requiring all managers to make use of the arsenal system and follow the requirements of the Secretariat level policy and the Arsenal Act³⁶. This series of mandates sets the ground rules for the arsenal system to be involved in a competitive environment.

Past policies concerning the maintenance of capability to support a mobilization philosophy, and the lack of a detailed methodology and funding to support surge and replenishment capability and capacity have seriously affected the cost efficiency of the arsenal system. The lack of an approved and published future direction and sound strategic business plan even after direction from Congress has exacerbated the problem of inefficiency.³⁷ Lack of focus through specific direction by senior Army leadership has caused the arsenal system to retain unnecessary and mismatched capability and capacity

in both skilled workforce and management capability. All of these factors contribute to a growing inefficiency in the arsenal system, which has steadily caused an increase in rates with an attendant decrease in funded workload. This spiral has continued to perpetuate itself until the arsenal system has made itself almost unaffordable.³⁸ The time has long since come when a decision concerning the future of the arsenal system and direction for that future must be provided.

RECOMMENDATIONS

While there is no lack of legislative language or policy on the use of the Arsenal Act to ensure that the arsenal system is not only considered in manufacturing requirements, but that it is considered in an economically competitive method, there is no clear, definitive statement from the Army leadership stating that the arsenal system continues to be a national resource and will be in the future as well. If the leadership can not make such a statement, then how committed is the leadership to the future of the arsenal system? Before any attempt is made to force the Army's Program Managers to use the arsenal system, the leadership must be committed to its viability as a source of production and manufacturing expertise and a center for development and prototyping of manufacturing technology for today's requirements as well as those of the future. This is a vital and inherently governmental responsibility and should be a core capability for an arsenal system, however else it may be described. The questions then become what additional capability may be required, for example limited manufacturing and production to retain and increase skills, what are the determinants for sizing the capacity to match the capability, and where this capability should reside. The potential solutions to location could be the consolidation of the arsenals system into a single location, incorporation into the Army Materiel Command's commodity command structure, or the research and development laboratories, or status quo. It is clear that status quo is not only unaffordable, it is ineffective. Some other solution must be found in addition to answering the fundamental question concerning other required capability for the arsenal system of the future.

If the Army leadership is not yet willing to fully describe a future arsenal system because of the uncertainty of future events, then a study of the requirements for an arsenal system must be commissioned in the very near future. This study must be performed with the continuing involvement of senior Army leaders who will act on the recommendations of such a study. The arsenal system of today can not long survive without a tremendous premium in cost of operation, a cost that could provide benefit in other areas if the Army is not fully committed to the value and continuation of the arsenal system.

Once a study concerning the future of the arsenal system is completed and a statement concerning the future issued, the next step should be the completion of a strategic business plan. Whether the arsenal system is seen as a resource that is limited to a knowledge and skill base with limited manufacturing capability or a more robust organization that provides production facilities for identified peacetime and surge requirements, this strategic business plan will provide the focus for moving the business area in the proper direction. The strategic business plan must include an evaluation of the requirements for the business areas and processes, the shaping process for moving from the processes

of today to those needed in the future, and the goals and objectives for the organization(s) that is proposed to meet these requirements. Measures of effectiveness must be clear, well-defined and objectively measurable as well as related to the specific goals and objectives of the business areas, not based on survival of the organization, but on the effectiveness, relevance and responsiveness of the organization to the stated requirements.

The method of review of Army requirements must be made an integral part of the DOD and Army planning process through the incorporation of the requirement for Critical Items List review in the Defense Planning Guidance and the Army programming guidance.

In the near-term, the current arsenal system must be reshaped to meet the known requirements. This includes divesting itself of accurately identified excess capability and capacity, shaping the skill base to match the capability requirements, defining the management and support structure necessary to provide the required planning and support to current workload and projected replenishment and surge requirements, and provide the training, education, and senior level commitment necessary to develop business processes that will cause the organization to become more efficient and competitive. This process of change to an effective business operating area should not wait for the determination of strategic direction, but needs to be initiated immediately so that the business will be able to assist in the change of direction once senior leadership makes those decisions.

These recommendations require a substantial level of investment, not just in funding but in the level of continuing commitment of the Army senior leadership to establish a direction for the future and see it through. This leadership oversight can be established in a corporate board process as previously discussed. It can also be combined in the current Army-level Depot Maintenance Corporate Board. Whatever the mechanism, it is the senior leader commitment to the oversight process that remains paramount.

SUMMARY

The Army arsenal system has provided an unsurpassed level of service and support to the United States Armed Forces almost since the birth of the nation. The direction that the arsenal system has taken has been a combination of meeting the requirements of mobilization in response to the nation's wars and, in some cases, a lack of specific and timely direction from senior leadership as the needs of the Army and the capabilities required of an arsenal system have changed. Tremendous amounts of funding and other resources and neglect have shaped the arsenal system that exists today. The value of the arsenal system in the 21st Century lies in its ability to be a center of expertise in the knowledge and skills required for the manufacture of the components and assemblies needed in the production of the Army's war materiel. This ability should be the hub of what is eventually decided as the arsenal system core capability. But the Army senior leadership must determine the full mission and direction for the arsenal system and commit to the significant investment in resources and involvement that will bring this direction to fruition. Without that direction and commitment the arsenal system will continue its path to irrelevance

and obsolescence. With this direction and commitment, the arsenal system, in its transformed and re-engineered state, will once again assume its role as a National Resource and meet the needs of the Army as a relevant, responsive and efficient enterprise. That future direction and the strategic business plan that implements the direction are the keys to the future of the arsenal system.

8775

ENDNOTES

¹ Commander, Frankford Arsenal, COL James L. Wallace, "A Brief History of Army Arsenals (Draft)," memorandum for BG Graham, Commander, U.S. Army Munitions Command, Philadelphia, PA., 5 October 1972, page 2.

² Ibid., 2.

³ Ibid., 3.

⁴ General Accounting Office, Army Industrial Facilities, Workforce Requirements and Related Issues Affecting Depots and Arsenals: Report to Congressional Requesters (Washington, D.C.: U.S. General Accounting Office, November 1998), 14.

⁵ MG Joe Arbuckle, "Arsenal Summit: Strategy for Success," Briefing Slides, Rock Island, IL, U.S. Army Industrial Operations Command, October 1999, 5, 13.

⁶ Philip Shiman, Forging the Sword, Defense Production During the Cold War (Washington, D.C.: U.S. Department of Defense Legacy Program, 1997), 3.

⁷ Arsenal Act, 10 U. S. Code, Section 4532 (1999).

⁸ Assistant Secretary of the Army for Acquisition, Logistics and Technology Paul J. Hoeper and Assistant Secretary of the Army for Financial Management and Comptroller, "Army Arsenals and Factories," memorandum for U.S. Army Major Command Commanders, Program Executive Officers and Army Staff, Washington, D.C., 22 October 1999.

⁹ Ibid.

¹⁰ Fred Smith, "Unutilized Plant Capacity," briefing slides, Rock Island, IL: U.S. Army Industrial Operations Command, August 1999, 9.

¹¹ Assistant Secretaries of the Army Paul J. Hoeper and Helen T. McCoy.

¹² General Accounting Office, 56-59.

¹³ Alan Wilson, Chief, Arsenal Team, U.S. Army Industrial Operations Command, Interview by author, 3 December 1999, Rock Island, IL.

¹⁴ Congress, House of Representatives, Committee on National Security, National Defense Authorization Act for Fiscal Year 1999, Report of the Committee on National Security House of Representatives on H.R. 3616, 105th Congress, 2d Session., 12 May, 1998, Section on Civilian Personnel Management.

¹⁵ Department of the Army, Depot Maintenance Enterprise Strategic Planning (Draft), (Washington, D.C.: Office of the Deputy Chief of Staff for Logistics, U.S. Department of the Army, June 1999).

¹⁶ Department of Defense, Program Budget Decision 407, Fiscal Year 2000, Subject: Ordnance (FOUO), (Washington, D.C. U.S. Department of Defense), 4-5.

¹⁷ General Accounting Office, 57.

¹⁸ Necessity for Core Logistics Capability, 10, U.S. Code, Section 2464 as amended by Public Law 105-85, National Defense Authorization Act for Fiscal Year 1998, Section 356, 1997.

¹⁹ Department of the Army, Capacity Analysis of the U.S. Army Maintenance Depots and Ordnance Activity Groups (OAGs), Final Report. (Washington, D.C.: Office of the Deputy Chief of Staff for Logistics, U.S. Department of the Army, 21 June 1999), Section – “Capacity Relationships at the Industrial Facilities”.

²⁰ Shiman, 3.

²¹ Arsenal Act.

²² MG John J. Deyermond, Deputy Chief of Staff for Logistics, U.S. Army Materiel Command, “Arsenal Strategic Plan,” memorandum for U.S. Army Industrial Operations Command Commander, Washington, D.C., November 1999.

²³ General Accounting Office, 58, footnote 3.

²⁴ MG Arbuckle, 6-15.

²⁵ General Accounting Office, 66.

²⁶ Assistant Secretaries of the Army Paul J. Hoeper and Helen T. McCoy.

²⁷ Necessity for Core Logistics Capability, 10 U.S. Code, Section 2464, Section 356.

²⁸ MG Arbuckle, 22.

²⁹ Assistant Secretaries of the Army Paul J. Hoeper and Helen T. McCoy.

³⁰ GEN John G. Coburn, Commander, U.S. Army Materiel Command, “Use of Arsenal Act in Make/Buy Decisions,” Memorandum for U.S. Army Materiel Subordinate Command Commanders, Washington, D.C., 2 November 1999.

³¹ General Accounting Office, 34, 35, 52.

³² MG Arbuckle, 30, 32, and back-up chart material.

³³ Arsenal Act.

³⁴ Necessity for Core Logistics Capability, 10, U. S. Code, Section 2464, Section 356.

³⁵ Assistant Secretaries of the Army Paul J. Hoeper and Helen T. McCoy.

³⁶ GEN Coburn.

³⁷ Congress, House of Representatives, National Defense Authorization Act for Fiscal Year 1999, Section on Army Civilian Personnel Management.

³⁸ MG Arbuckle, 22.

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